United States Environmental Protection Agency **Office of Research and Development**

National Exposure Research Laboratory
Research Abstract

Government Performance Results Act (GPRA) Goal 4
Annual Performance Measure #278

Significant Research Findings:

Geospatial Data Accuracy Assessment Report

Scientific Problem and Policy Issues

The development of robust accuracy assessment methods for the validation of spatial data represents a difficult scientific challenge for the geospatial science community. The importance and timeliness of this issue is related directly to the dramatic escalation in the development and application of spatial data throughout the latter part of the 20th century. This trend, which is expected to continue, will become evermore pervasive, and continue to revolutionize future decision making processes. However, our current ability to validate large-area spatial data sets represents a major impediment to many future applications. Problems associated with assessing spatial data accuracy are primarily related to their valued characteristic of being continuous data, and to the associated geometric or positional errors implicit with all spatial data. Continuous data typically suffer from the problem of spatial autocorrelation which violates the important statistical assumption of "independent" data, while positional errors tend to introduce anomalous errors with the combining of multiple data sets or layers.

Research Approach

This report documents the results of a special symposium sponsored by the U.S. Environmental Protection Agency (EPA) on "Remote Sensing and GIS Accuracy Assessment" on December 11-13, 2002 in Las Vegas, NV. The symposium evaluated the important science elements relevant to the performance of accuracy assessments for remote sensing derived data and GIS data analysis and integration products. A total of 27 technical papers were presented over the two and one-half day symposium by an international group of scientists representing federal, state and local governments, academia, and non-governmental organizations. Specific technical presentations examined sampling issues, reference data collection, edge and boundary effects, error matrix and fuzzy assessments, error budget analysis, and special issues related to change detection accuracy assessment. Subsequent to the symposium, presenters were invited to submit manuscripts for consideration as chapters. This report contains 20 chapters that represent the important symposium outcomes. All chapters were extensively peer reviewed by leading experts in the field of spatial data accuracy assessment.

Results and Impact

The report addresses many of the relevant considerations for evaluating the quality of geospatial data products. Specific elements addressed in the report include statistical sampling designs, reference data types and collection methodologies, and classical error assessment and fuzzy set statistical analysis. This report serves as a reference source for both geospatial data providers and users. Data users will find the report particularly useful for the development of sampling designs and

	methods to quantify geospatial data quality in relation to established data quality objectives (DQOs) for specific applications. All geospatial data producers and users can potentially benefit from this report.
Research Collaboration and Research Products	This effort was a collaboration with numerous universities and Federal agencies. A complete listing of all collaborators is included in the report. Examples of recent publications from this study include: *Geospatial Data Accuracy Assessment*, R.S. Lunetta & J.G. Lyon (Editors), U.S. Environmental Protection Agency, Report No. EPA/600/R-03/064, Las Vegas, NV, 339 p., 2003.
Future Research	Additional research is being conducted to develop statistically rigorous approaches for evaluating geospatial data quality.
Contacts for Additional Information	Questions and inquiries can be directed to: Ross S. Lunetta U.S. EPA, Office of Research and Development National Exposure Research Laboratory 109 T.W. Alexander Drive (E243-05) RTP, NC 27711 Phone: 919/541-4256 E-mail:lunetta.ross@epa.gov Funding for this project was through the U.S. EPA's Office of Research and Development, National Exposure Research Laboratory, and the work was conducted by the Environmental Sciences Division.